REMARKS

Re-examination and favorable reconsideration in light of the above amendment and the following comments are respectfully requested.

In the Office Letter dated 17 March 2003, the Examiner objected to the disclosure as lacking the status of co-pending application serial no. 09/983,046. By the present amendment, the status of this application has been updated. Consequently, the Examiner is hereby requested to remove the objection.

Further, in said Office Letter, the Examiner objected to the drawings, in particular Fig. 3. It is believed the confusion regarding the possibility that two different parts in FIG. 3 have been labeled 12 has been caused by the units digit at the end of the lead line to the center mass being a poorly formed "6" which resembles a "2" (in the originally filed informal drawing). Applicant has submitted a corrected FIG. 3 as an attachment to this Amendment, in which this is clarified. It is submitted that there are no ambiguities in this figure. If the Examiner wishes to further amplify on this point, Applicant may be able to get a better understanding of the problem. Further, the figure in Applicant's position does have mass 16 labeled. As for the labeling of the element 15, in Applicant's opinion, this is appropriate. No drawing correction in the nature of the relabeling of parts, as the Office Action

requires, need be made, and it is requested that these requirements be withdrawn.

Accordingly, it is requested that the attached corrected drawings, which are in the form of formal drawings, be approved by the Examiner.

Further, in said Office Letter, claims 1, 2, 6, 8, 9, and 11-14 were rejected under 35 U.S.C. § 102(e) as being anticipated by Schroeder et al. (reference A: U.S. Patent No. 6,218,661). The Examiner contends that Schroeder et al. disclose an apparatus comprising at least one optical fiber supported in a structure, a movable mass supported within the structure, and means for detecting changes in tension in the at least one optical fiber due to movement of the movable mass. The Examiner further contends that Schroeder et al. disclose an apparatus wherein: (1) the detecting means comprise at least one fiber optic Bragg grating written into a core of each of said optical fibers; (2) detecting means comprise Bragg grating laser sensor associated with each optical fiber; (3) the structure comprises a cage; (4) a gap is provided between each side of the mass and cage, which gap is sufficiently small to limit motion of the mass in shock or high acceleration and to limit the maximum tension seen by each of the optical fibers; and (5) the optical fibers are the only deformable structure within the sensor.

Still further in said Office Letter, claims 3-5, 7, and 10 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Schroeder et al. With regard to claims 3-5, the Examiner recognizes that Schroeder et al. do not explicitly disclose an apparatus wherein a plurality of optical fibers has a first fiber optic Bragg grating associated with a first reflective wavelength and a plurality of optical fibers having a second fiber optic Bragg grating associated with a second reflective wavelength. The Examiner contends that it would be obvious to modify the apparatus of Schroeder et al. such that it incorporated the aforementioned limitations. The Examiner contends that one would have been motivated to make such a modification so that sense impressions of a plurality of optical fibers can be identified as being a variant with respect to differing optical gratings.

With respect to claim 7, the Examiner acknowledged that Schroeder et al. do not explicitly disclose an apparatus wherein the movable mass is surrounded by optical fibers and being in contact with optical fibers. The Examiner contends however that it would have been obvious to modify the apparatus of Schroeder et al. such that it incorporated the aforementioned limitation. The Examiner contends that one would have been motivated to make such a modification so that the device is configured to sense changes within the structure relative to the movable mass.

With regard to claim 10, the Examiner acknowledges that Schroeder et al. do not explicitly disclose an apparatus wherein a single optical fiber has a serpentine configuration with a plurality of legs and wherein the detecting means comprises a detector in each of the legs. The Examiner contends that it would have been obvious to modify the apparatus of Schroeder et al. such that it incorporated the aforementioned limitation. The Examiner contends that one would have been motivated to make such a modification so that the device is configured to sense changes within the structure relative to the length of the enclosed optical fiber.

The foregoing prior art rejections are respectfully traversed by the instant response.

With respect to the 102 rejection over Schroeder et al., the Examiner is mistaken in stating that Schroeder et al. describe a device for a movable mass which creates a tension change in a fiber and a means for detecting the change in the fiber. Schroeder et al.'s invention uses a movable mass to create a transverse strain on the fiber, i.e., the fiber is compressed between the movable mass and another body. The transverse strain creates birefringence in the fiber and results in the fiber Bragg grating reflecting the two separate peaks from an unpolarized source due to the differences in the fact of index in orthogonal polarization directions. Schroeder et al.'s device does not result in the fiber being tensioned, i.e.,

longitudinal strain being applied to the fiber in the direction of the fiber axis as in the present invention.

The Examiner is mistaken in stating that the measuring means is the same, that is, that Schroeder et al. describe the means for detecting changes in tension in the fiber. Schroeder et al.'s device works by detecting birefringence differences in the fiber. The effect is that in the reflection spectrum of the Bragg grating, two separate peaks appear and the difference between these two peaks and changes in the difference are measured to determine the transverse strain on the fiber. In the present invention, the longitudinal strain retention of the fiber is effected. The Bragg grating does not exhibit birefringence and only reflects one spectrum peak. The change in the one spectrum peak is measured to determine the tension changes on the fiber.

While Schroeder does describe a movable optic such as a piston which moves to apply the transverse strain to the fiber, the movement they are concerned with is not due to the object's mass but due to ambient pressure applying force to the piston by means of a membrane. The present invention however fundamentally depends on the mass of the object and is designed to detect the effect of gravity on that mass.

This is related to the fundamentally different object of the two devices. In all of Schroeder et al.'s description, and in their claims, a device is presented for measuring ambient

pressure, not gravity as in the present invention. Schroeder et al. never discuss applications of their sensor to measure parameters of the compression. Again, the Schroeder et al. device is fundamentally different from that of the present invention--namely, the mechanical effect on the fiber, used to make the measurement, is different, and the optical result which is measured is different.

The intention of the present invention is to detect the orientation of a body relative to the local gravity vector. Gravity is a vector, hence the measurement in question is necessarily a directional one. The present invention uses a plurality of fibers, typically three or four, to detect differences in the fiber strains in order to determine the direction of gravity. Schroeder et al.'s device on the other hand is to measure pressure only, a scalar quantity. Therefore, only one fiber grating measurement is required and only one is described. Schroeder et al. never describes how to make a vector measurement using their device. Schroeder et al. is intent on very accurately measuring pressure. The present invention is not equally intent on accurately measuring the magnitude of gravity. Only the differences in tension between the fibers are required in order to determine accurately the direction of gravity. Effects such as temperature, which are expected to be substantially the same on all of the fibers, are eliminated to first order by considering only the differences

between the different fiber sensors. Schroeder et al. must make an additional optical measurement and an additional calibration in order to determine temperature and remove its effect from the present measurement.

In conclusion, the present invention and the device shown in Schroeder et al. are fundamentally different, measuring different phenomena, using different mechanical strains on the fiber, using different optical measure means, and measuring the direction of a vector property rather than the magnitude of the scalar.

With respect to the claims pending in the application, claims 1 and 11 are clearly allowable because Schroeder et al. fails to teach or suggest the claimed detecting means. With regard to the remaining claims in the application, these claims are allowable for the same reasons as claims 1 and 11 as well as on their own accord. It is submitted that Schroeder et al. fails to teach or suggest the combination of elements set forth in each of these claims.

With respect to the obviousness rejection made by the Examiner, it is submitted that the Examiner has failed to make out a *prima facie* case of obviousness. The Examiner has not pointed to any reference which would teach or suggest the proposed modifications to Schroeder et al. With regard to the modifications proposed by the Examiner to show motivation for making same, it is submitted that the Examiner had the benefit

of reading Applicant's disclosure and thus these rejections are nothing more than a hindsight rejection. Absent some teaching or suggestion to make the modification or some motivation in some prior art reference, the rejection must fail. The Examiner is hereby requested to withdraw the obviousness rejection of claims 3-5, 7, and 10. Should the Examiner wish to maintain such a rejection, he is hereby requested to provide proper teaching references.

For the above reasons, the instant case is believed to be in condition for allowance. Such allowance is respectfully solicited.

The Examiner is invited to phone Mr. Michael F. Oglo, attorney for Applicants, 401-832-4736, if in his opinion such phone call would serve to expedite the prosecution of subject patent application.

Respectfully submitted,

GREGORY H. AMES ET AL

17 July 2003

By Michael F Oglo
MICHAEL F. OGLO
Attorney of Record
Reg. No. 20464

Attachment:
Set of corrected Formal Drawings (2 shts)